APS-NR2

User Manual

Revision 1.0.0

APS-NR2 User Manual

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1 Introduction

1.1 Foreword

You made an excellent choice buying the Altus Positioning Systems Network Rover.

Don't drop the call!

Do not lose time with dropped calls. Your source of corrections is most secure with APS-NR2.
It has been designed with a dual antennae cell modem to optimize call retention.

Light

Despite its smarts on board and the wireless technologies the APS-NR2 only weighs 760 grams and measures only 167mm in diameter.

Work all day

The batteries of the APS-NR2 are hot swappable.
With the two batteries in the device and the two spares you will span more than a full working day!
The charger and batteries are non proprietary so it is easy and inexpensive to keep spares.

Use your existing phone or tablet

The APS-NR2 communicates with any device having a Wi-Fi radio.
Simply connect to the APS-NR2, open your browser and your APS-NR2 is configured within minutes.

Esri ready

The APS-NR2 has been designed specifically for users of ArcGIS to enrich their database with highly accurate positions. Alternatively you may use the APS-NR2 with industry leading survey software like SurvCE, Field Genius or Digiterra.

Works in any network

The APS-NR2 works within all types of RTK networks. Its auto detect function selects the correction type!

1.2 APS-NR2 Technical Characteristics

The APS-NR2 provides multi-frequency GNSS capability and wireless communications.

- a Septentrio AsteRx-m GNSS receiver inside.
- Fully wireless operations via Wi-Fi, Bluetooth and Cell networks.
- Intuitive device-independent graphical web-interface.
- Four Li-Ion hot-swappable batteries.
- 8GB memory for internal data logging.

1.2.1 GNSS Key Features

136 Channel AsteRx-m, with L1/L2/L2C GPS, GLONASS and SBAS.
RTK, SBAS, DGPS and Standalone positioning modes.

Navigation Performance	Horizontal (m)	Vertical (m)
Standalone (Autonomous)	1.3	1.9
SBAS (WAAS, EGNOS, MSAS)	0.6	0.8
DGPS (RTCM1,3 / 9,3)	0.5	0.9
RTK (Fixed)	0.006 + 0.5 ppm	0.01 + 1 ppm

Table 1: APS-NR2 Facts & Figures

The APS-NR2 can be mounted on a standard survey rod with a 5/8" thread.

1.3 User Notice

This section provides information regarding Warranty and Customer Service. ALTUS Positioning Systems reserves the right for improvements and changes to this document, products and services without notice or obligation.

1.4 Warranty

ALTUS provides a two-year warranty for the APS-NR2 receiver, free from defects in materials and workmanship, from the date of sale on the invoice of the original buyer. A ninety-day warranty is provided for the cables and other accessories. Firmware upgrades are free for life. Software support is free for one year from date of purchase.

The warranty does not cover:

- Defects due to accidents, abuse, misuse, negligence, abnormal use or any other non-recommended use.
- Defects due to environmental conditions that do not conform to APS-NR2 specifications.
- Defects due to improper installation or operating procedures.
- Defects due to modifications, alterations, or changes not made in accordance with the APS-NR2 User Manual and other technical documentation or directly authorized by ALTUS.
- Normal wear and tear use.
- Shipping damage.
- Third party software included with the product, other than the warranty of the original manufacturer to the extent the manufacturer permits.

The warranty is void if the APS-NR2 has been tampered with or opened.

1.5 Technical Support

Contact your ALTUS dealer for first-line support. For further information, please see the Altus support website for documentation and firmware upgrades, or contact ALTUS Technical Support:

North and South America:

Altus Positioning Systems
20725 Western Avenue, Suite 100
Torrance, California 90501, USA

Phone: +1 (310) 541-8139
Fax: +1 (310) 541-8257
sales@altus-ps.com
support@altus-ps.com

EMEA APAC

Septentrio Satellite Navigation
Interleuvenlaan 15G
BE3001 Leuven Belgium

phone: +32 (0) 16 300 800
Fax: +32 (0) 16 221 640
sales@septentrio.com
support@altus-ps.com

1.6 CE NOTICE

CE1588

Receivers of the APS-NR2 family carry the CE mark and are as such compliant with the 2004/108/EC -EMC Directive and amendments, 2006/95/EC - Low Voltage Directive, both amended by the CE marking directive 93/68/EC.

With regards to EMC, these devices are declared as class B, suitable for residential or business environment.

CE RF exposure compliance

This device meets the EU requirements (1999/519/EC) and the International Commission on Non-Ionizing Radiation Protection (ICNIRP) on the limitation of exposure of the general public to electromagnetic fields by way of health protection.
To comply with the RF exposure requirements, this equipment must be operated in a minimum of 20 cm separation distance to the user.

1.7 ROHS/WEEE NOTICE

Receivers of the APS-NR2 family comply with European Union (EU) Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS Directive).

Receivers of the APS-NR2 family comply with the European Union (EU) Directive 2002/96/EC on waste electrical and electronic equipment (WEEE). The purpose of this Directive is the prevention of waste electrical and electronic equipment (WEEE), and in addition, the reuse, recycling and other forms of recovery of such wastes so as to reduce the disposal of waste. If purchased in the European Union, please return the receiver at the end of its life to the supplier from which it was purchased.

1.8 FCC Regulations

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user‘s authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.

—Increase the separation between the equipment and receiver.

—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

—Consult the dealer or an experienced radio/TV technician for help.

1.8.1 FCC RF Exposure Compliance

This equipment complies with radio frequency (RF) exposure limits adopted by the Federal Communications Commission for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

1.9 IC Regulations

RSS-Gen 7.1.3

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

(1) this device may not cause interference, and

(2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

(1) l'appareil ne doit pas produire de brouillage, et

(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement."

1.9.1 IC RF Exposure Compliance (MPE)

This equipment complies with IC RSS-102 RF exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

1.9.2 Déclaration d'exposition aux radiations

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

1.10 Safety Information

Statement 0000/WARNING: IMPORTANT SAFETY INSTRUCTIONS
This warning symbol means danger and indicates that you are in a situation that may result in body injury and physical damage. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and familiarize yourself with standard practices for preventing accidents. Use the statement number provided at the beginning of each warning to locate its translation in the translated safety warnings that accompany this device.

Statement 0001/WARNING: The power supply provided by Altus should not be replaced by another.

Statement 0002/WARNING: Ultimate disposal of this product should be handled according to all national laws and regulations.

Statement 0003/WARNING: The equipment and all the accessories included with the product may only be used according to the specifications in the delivered release note, in the manual and in all other documents delivered with the receiver.

Statement 0004/WARNING: Never place the equipment or its batteries in an environment where the specified maximum storage temperature can be exceeded.

Statement 0005/WARNING: The outside of the instrument may be cleaned using a clean, lightly dampened cloth. Do not use any cleaning liquids containing alcohol, methylated spirit, ammonia etc.

2 Shipping Case Contents

One APS-NR2 system includes the following items:

Item	Purpose
USB Cable	Configuration via USB
Four Li-Ion Batteries	Powering the APS-NR2
Battery Charger	Dual bay external battery charger via a wall plug or a cigarette lighter
USB stick	Software Programs and Manuals
Wall Charger	Charging the batteries from a wall plug while they are inside the APS-NR2

Table 2: APS-NR2 Delivery Package

The package always contains two EU power cables: One is needed for the battery charger and one for the wall charger. The power cables of the battery charger and the wall charger are interchangeable.
When shipped outside of continental Europe, two extra power cables matching the requirements of the country of destination are added.

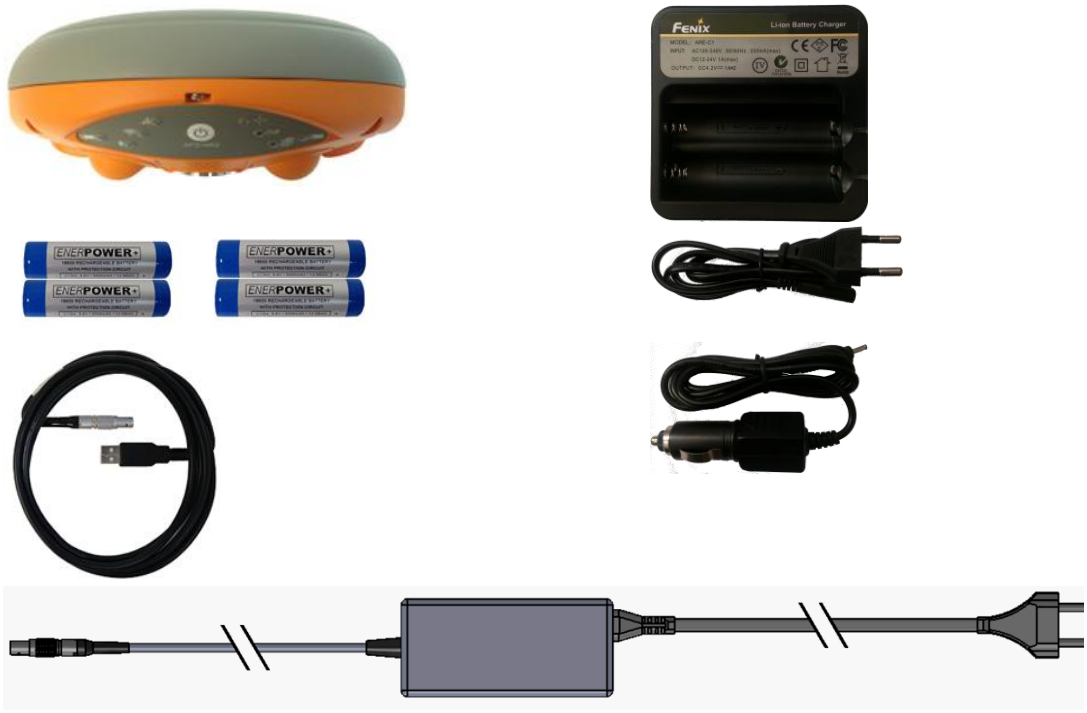


Figure 1: Shipping Contents

3 APS-NR2 Overview

This section will guide the user through the main parts of the APS-NR2. The detailed steps how to configure the APS-NR2 will be elaborated in later sections.

3.1 Front Panel

The APS-NR2 has an intuitive front panel with status LEDs and the power button.

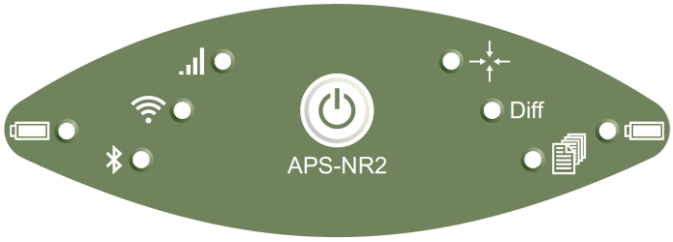


Figure 2: APS-NR2 Front Panel

The table below provides a brief overview of the LED indications.
A complete table is provided in section "12.2 Front Panel LEDs" on page 47.

	Function	Indication
	Battery Power Level	Battery Power level (Green to Red) solidly lit = battery is in use, blinking = battery is not in use
	Bluetooth (not) paired	Bluetooth is off (not lit), connecting (blinking), Paired (blue)
	Wi-Fi On/Off	Wi-Fi On (Green) or Off (not lit)
	Cellular Modem Status	The modem is not in use (not lit), connecting (orange), connected (green) or there is an error in the connection (red)
	Position Mode	The reported position is “RTK Fixed” (green), Stand alone (red), any other mode (orange) or no position can be calculated (not lit)
	Differential Corrections	Differential Corrections are being received (Green) or differential Corrections are not being received (not lit)
	Data Logging	Logging is disabled (not lit), active (green)

Table 3: APS-NR2 : Front LED – Short

3.2 Power Button Functions

APS-NR2 power status	User Action	Effect
While the device is off	**CLICK**	**Switches on the APS-NR2**
	HOLD **4 seconds**	**Resets the device to factory default**
While the device is on	**CLICK** **CLICK**	**Toggles the Wi-Fi radio on and off**
	CLICK	**Toggles logging on and off** **The LED only switches on if messages have been selected for logging**
	HOLD **2 seconds**	**Powers off the device**

3.3 Location of Batteries and SIM card

The APS-NR2 contains two battery bays. The positive lead for the batteries is located nearest to the front label.
The SIM card slot is located under the left battery bay.
The SIM card slot is covered with a watertight cover.
Only a micro SIM card will fit into the slot.

Figure 3: SIM Card Slot

3.4 Closing the battery door

Figure 4: Closing the battery door

- Press firmly at the position indicated by the grey arrow.
- The battery door is only latched after a firm click is heard.

3.5 APS-NR2 Connector

The APS-NR2 has one 9-Pin Lemo connection. This allows charging the batteries while they are inside the APS-NR2 using the wall charger. Using the USB cable it allows for data transfer.

Figure 5: APS-NR2 Port Connections

3.6 The Web Interface

The APS-NR2 can be fully configured and monitored using its Web Interface.
In the following sections it will be explained how to get access the Web Interface and use it to configure to APS-NR2 to your needs.

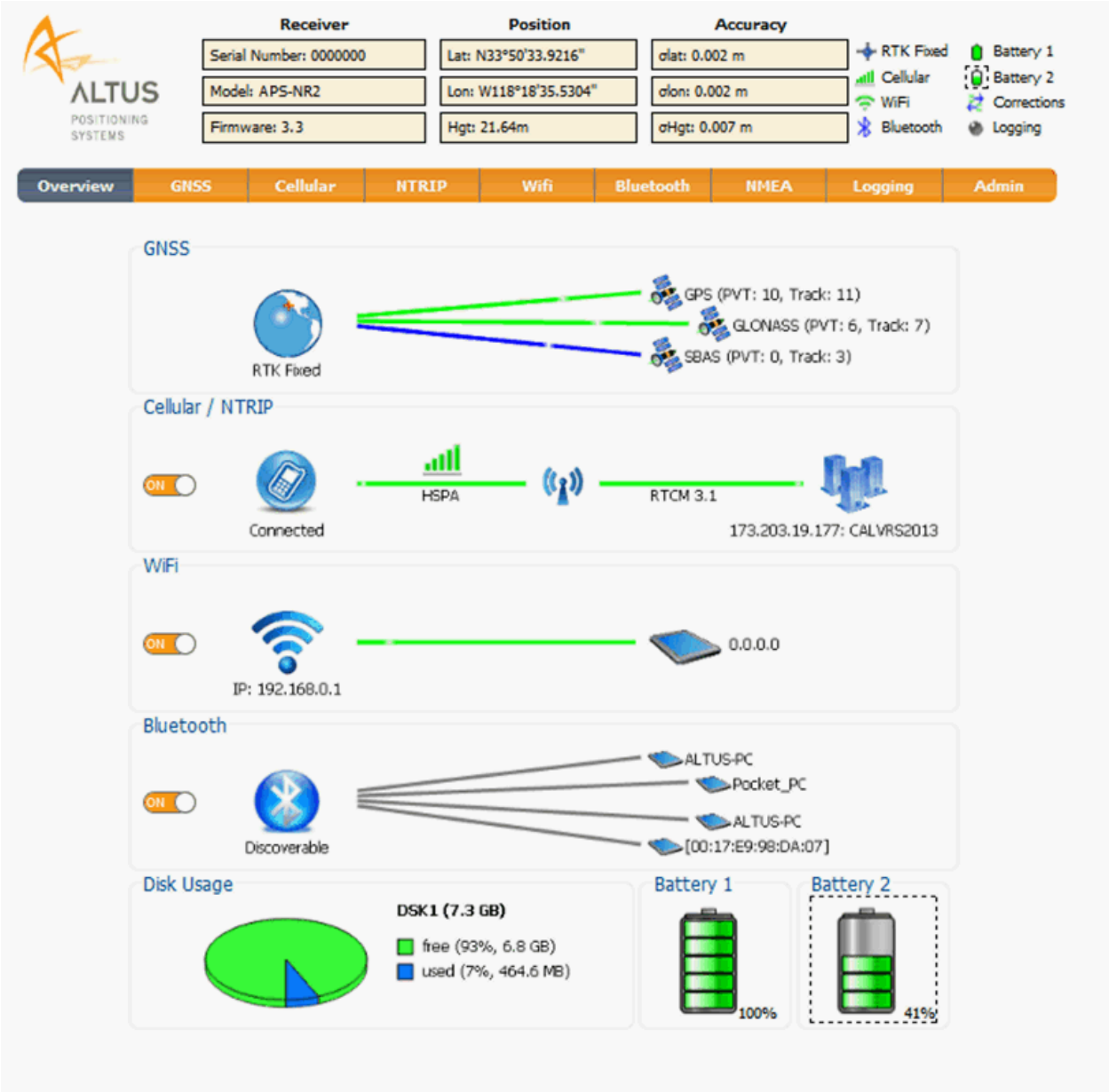


Figure 6: APS-NR2 Web Interface

4 Initial set up

4.1 Prerequisites

An Activated Micro SIM Card

In some countries a PIN and PUK code are required to use the card.
If so, make sure you have the codes at hand.
To establish a data connection an Access Point Name (APN), user name and password are needed. If you do not have this information, you need to request it from the telecom provider.

An active RTK (NTRIP or TCP/IP) service

A subscription for a (NTRIP or TCP/IP) correction service.

Charged Batteries

Make sure you have two charged batteries.
Empty batteries may take three to four hours to charge.

A APS-NR2 Wall Charger

As an alternative you can power the APS-NR2 using the wall charger when configuring the APS-NR2.

A phone, tablet or computer with a Wi-Fi radio

A Wi-Fi enabled device is needed to configure the APS-NR2 using the Web Interface.

4.2 Insert the micro SIM card

Turn off the APS-NR2 to install or remove the SIM card. Damage to the SIM card may occur if installed or removed while power is on

1. Put the APS-NR2 on a flat surface with its battery compartments facing up as shown in Figure 3 on page 15.
2. Open the battery compartment.
3. Open the SIM card compartment
4. Put the micro SIM card down in the SIM card compartment.
5. Slide the micro SIM card gently towards the front panel of the APS-NR2 until a click sounds.
6. Gently close the SIM card compartment.

4.3 Insert the batteries

1. Place the two batteries in their compartments with their positive leads pointing to the front panel of the APS-NR2.
2. Close the two battery doors.
   The doors click audibly when latched.

4.4 Switch on the APS-NR2

Click the power button once to switch on the APS-NR2.

4.5 Wait for the APS-NR2 to start up

It takes about two minutes for the APS-NR2 to start up.
It is advised to avoid clicking the power button during the start up sequence.
During the start up test sequence the LEDs will blink before they stabilize and indicate the status correctly.

4.6 Make sure the Wi-Fi radio is switched on

The default way of configuring the APS-NR2 is using the Web Interface over Wi-Fi.

1. If the Wi-Fi radio is already switched on, the Wi-Fi LED is lit.
2. If the Wi-Fi LED is not lit, click the Power Button twice briefly.
   The Wi-Fi LED will switch on, indicating the radio is now active.

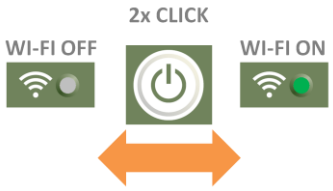


Figure 7: APS-NR2 Wi-Fi On-Off

4.7 Connect to the Web Interface

Any device with Wi-Fi can connect to the APS-NR2 and use the Web Interface.

The APS-NR2 identifies itself as wireless network or an access point.
Before starting the procedure below, it is advised to get acquainted with the procedure of your device (phone, tablet, computer) for connecting to a Wi-Fi network.

1. Ensure the APS-NR2 is fully booted (about 2 minutes).
2. Ensure the Wi-Fi is enabled on the APS-NR2 as described in section 4.6 on page 19.
3. Using your preferred device, select the Wi-Fi application and find the wireless network called APS-NR2-<Serial Number>.
4. The default password is empty.
5. Open a browser and type the default IP '192.168.20.1' in the address bar
6. The browser will land on the Overview tab of the APS-NR2 Web Interface.

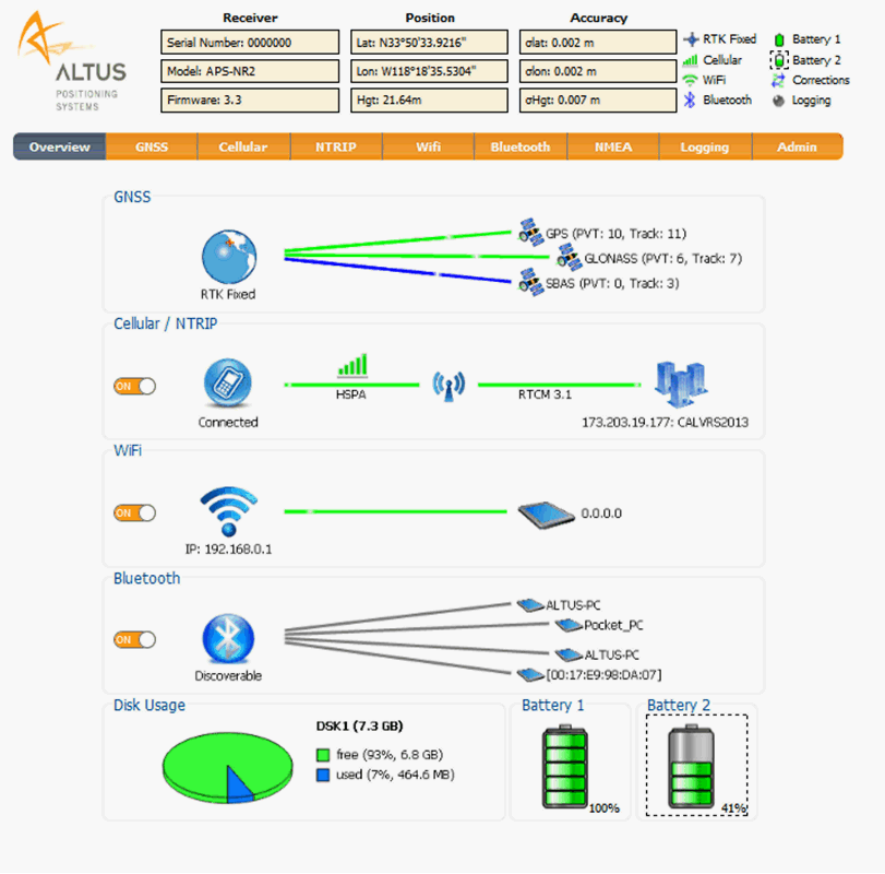


Figure 8: Web Interface Overview Tab

5 Basic Configuration of the APS-NR2 for RTK

After successfully executing the steps in "Initial set up", your APS-NR2 is ready to be configured to receive corrections and output position data.

After each change made to the APS-NR2's configuration while executing the steps in the following sections the pop up will appear in the bottom right of the browser window.
If the user clicks Save, the settings are stored in the boot configuration and will be applied again when the APS-NR2 is restarted.
The configuration mechanism is explained in detail in section "11.1.1 Configuration" on page 39.

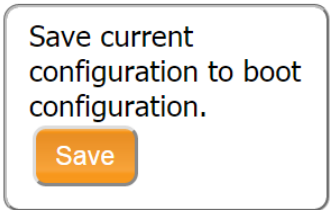


Figure 9: Save to Boot pop up

5.1 Set up the cellular modem

1. Click the Cellular tab on the Web Interface to show the status of the Cell Modem.
2. Enter a Cellular PIN, APN, Username and Password from this tab.
3. Make sure the 'on' radio buttons of both Power and Connect are selected.
4. Click OK

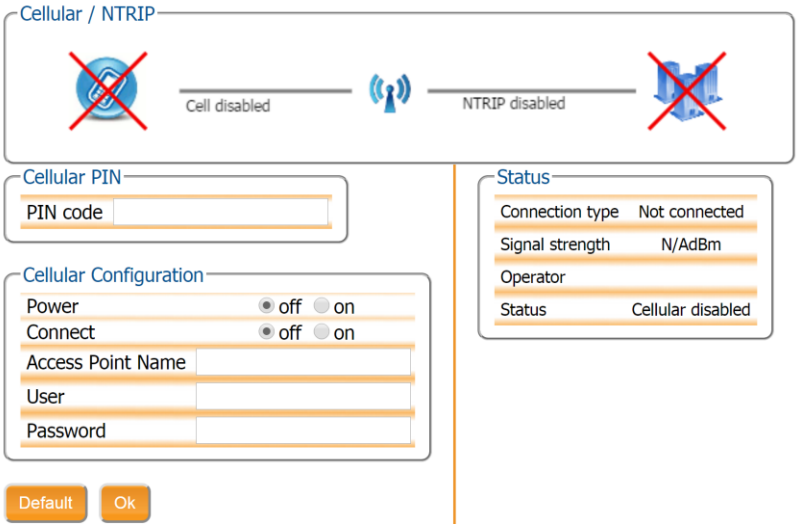


Figure 10: Cellular Status : Cell disabled

If the connection has been established successfully, the Status will change from Initializing→Connecting→Connected as shown in Figure 11 and Figure 12.
The line on the left hand will turn green and indicate the connection type (e.g. HSPA) and Status fields on the bottom right of the page will be filled as shown in Figure 10.

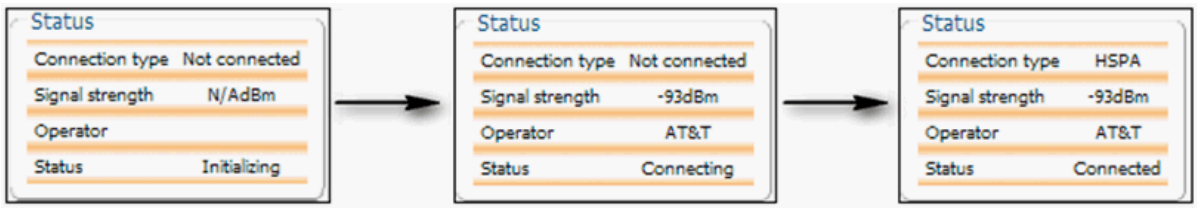


Figure 11: Cellular Status: Getting connected

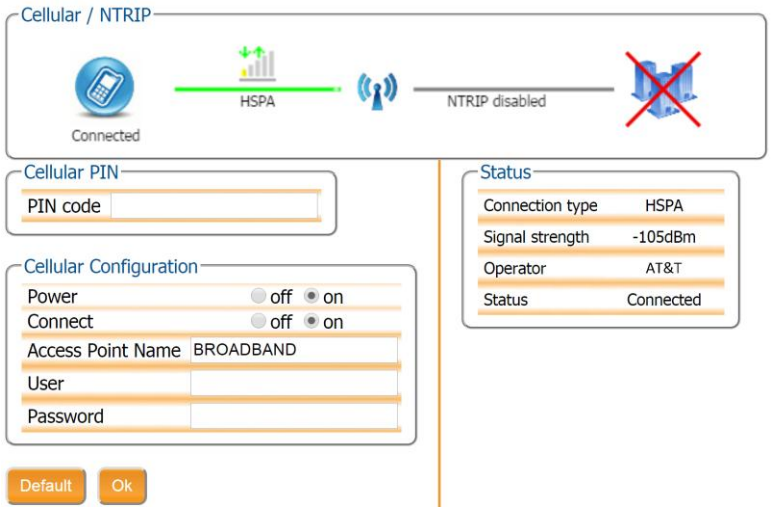


Figure 12: Cellular Status: Connected

5.2 Configure as NTRIP client

1. Make sure you have a cellular connection as described in the previous section.
2. Select the NTRIP tab on the APS-NR2's Web Interface.

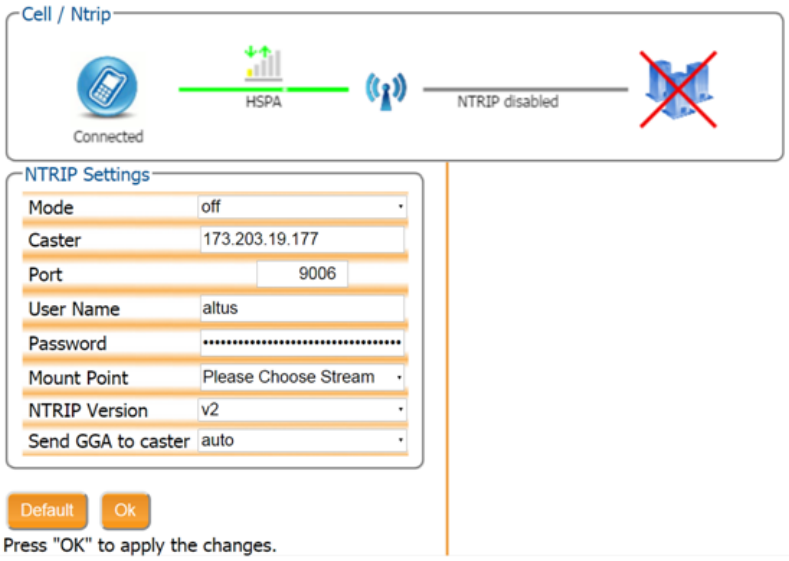


Figure 13:NTRIP tab of the Web Interface

3. Select 'Client' in the Mode drop down box.
4. Enter the Caster server name or IP address and the Port of your CORS.
5. Enter the User Name and Password of your account.
   The NTRIP password will automatically be encrypted and not shown for security.
6. Once the NTRIP Mode, Caster, and Port are entered, the Mount Point drop down box will be populated.

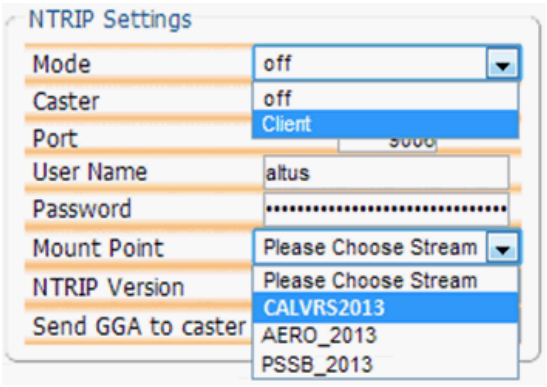


Figure 14: NTRIP Settings

7. Select a Mount Point in the drop down box.
8. Click OK
9. The APS-NR2 will automatically initialize and connect.

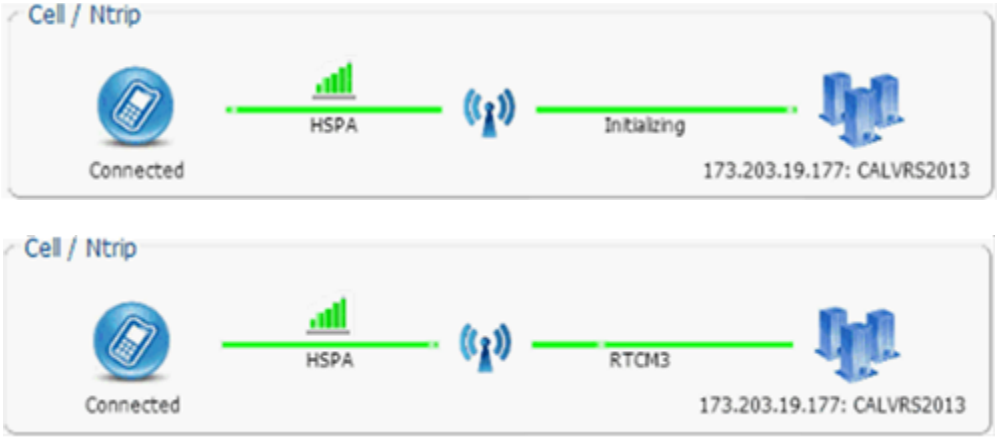


Figure 15: NTRIP Initialization

If the Mode Field is set to 'Client', the APS-NR2 will auto-connect to the NTRIP Caster each time it is powered.
If the Mode Field is set to 'Off', no corrections will be received and the APS-NR2 will not auto-connect to the caster when switched on.

5.3 APS-NR2 Configured for RTK

After finishing the steps in the sections "Introduction" and "Basic Configuration of the APS-NR2 for RTK" the APS-NR2 is receiving corrections and is able to calculate a position.

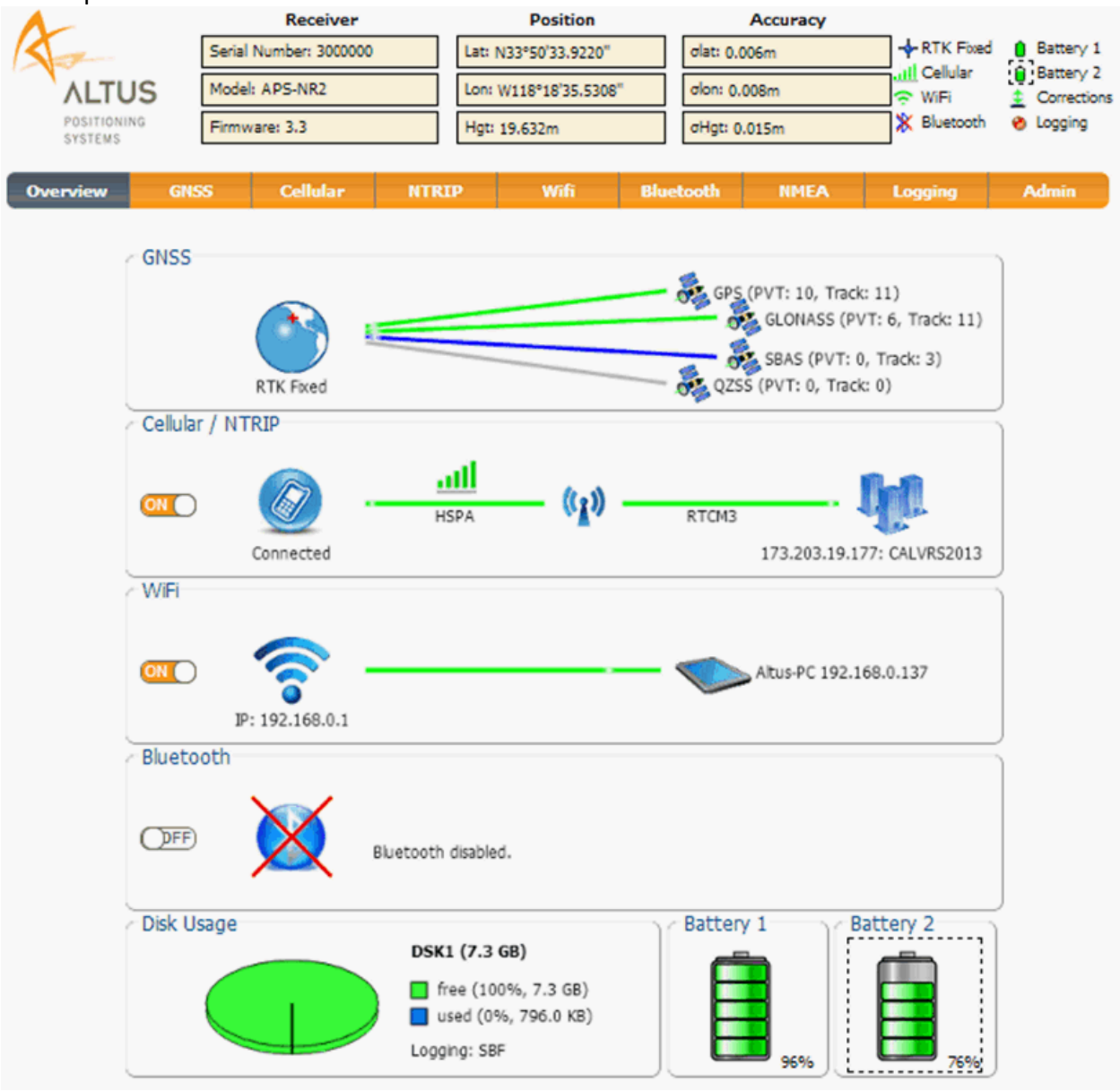


Figure 16: Overview tab after Basic Configuration

6 Configuring the output

6.1 Connect Bluetooth

The APS-NR2 uses its Bluetooth connection to output data to an application running on a tablet, phone or computer.
Before starting the procedure below, it is advised to get acquainted with the procedure of your device (phone, tablet, computer) to connect to a Bluetooth accessory (APS-NR2).

1. Select the Bluetooth tab on the APS-NR2's Web Interface.
2. The Bluetooth tab shows the Device name and Pairing code you need to connect to your device consuming the data produced by the APS-NR2
3. Using your preferred device, select the Bluetooth application and find the Bluetooth device name of your APS-NR2 and Execute the pairing sequence.
   By default the Bluetooth Device name is APS-NR2-<Serial Number>.
4. The Bluetooth name of the device you connected to appears on the right hand side of the Bluetooth icon in the Bluetooth tab.
5. Using your preferred GIS or Survey application on the device make sure you connect to the Bluetooth port created by the Bluetooth manager of your device.

Unless there are specific reasons to make the APS-NR2 undiscoverable, it is advised to leave the Discoverable option switched on.
The device name and pairing code may be changed for user preference. Also, the Bluetooth module may be powered on/off and set to discoverable from this tab.

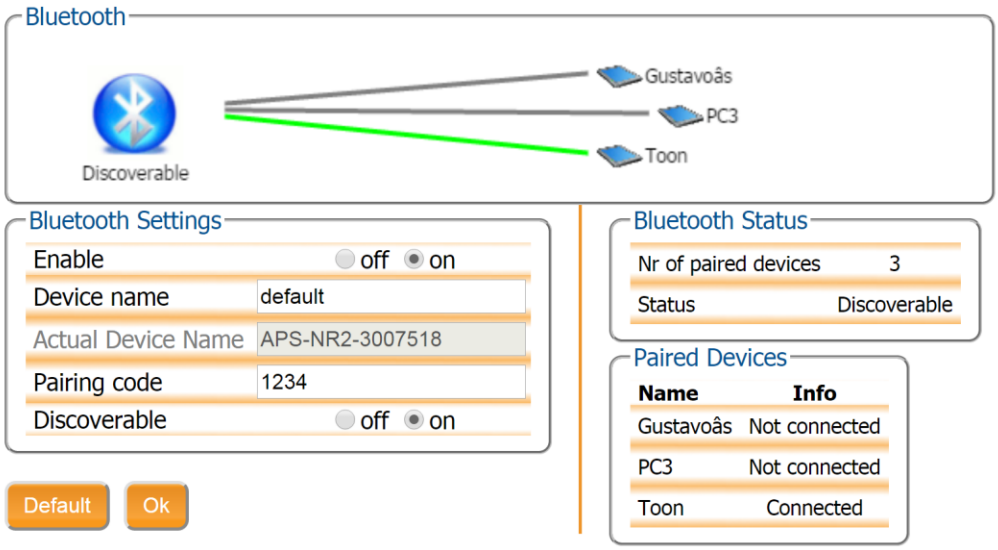


Figure 17: Web Interface Bluetooth

6.2 Configure the NMEA for Bluetooth output

The NMEA tab allows the user to view paired Bluetooth devices and start/stop NMEA.

1. Click the NMEA tab on the APS-NR2's Web Interface
2. Select the required NMEA messages and the required Interval
3. Make sure the Output is set to On
4. Click OK

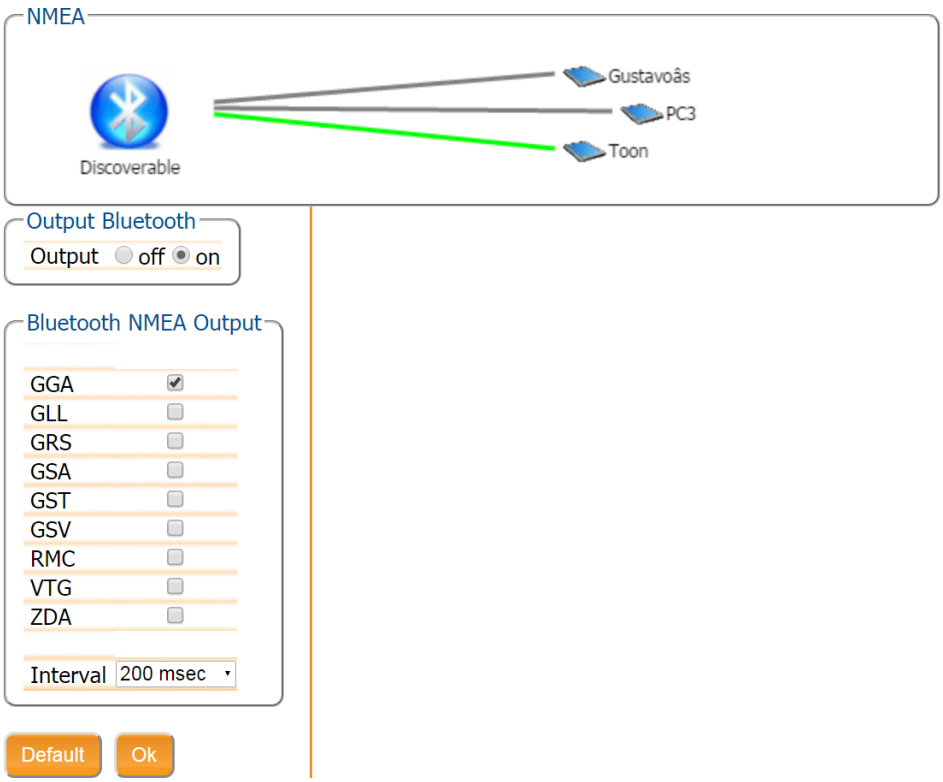


Figure 18: Web Interface NMEA

6.3 Activate Logging

6.3.1 Basic Configuration of Logging

The Logging functionality allows data to be stored on the APS-NR2's internal disk.
This disk has a capacity of 8GB.
The user may select SBF blocks (Septentrio Binary Format) and/or NMEA messages (National Marine Electronics Association) to be logged.
Data logged can be downloaded in the File Explorer menu by clicking the green arrow in the Download column.
The downloaded file will be in the browser's download directory.

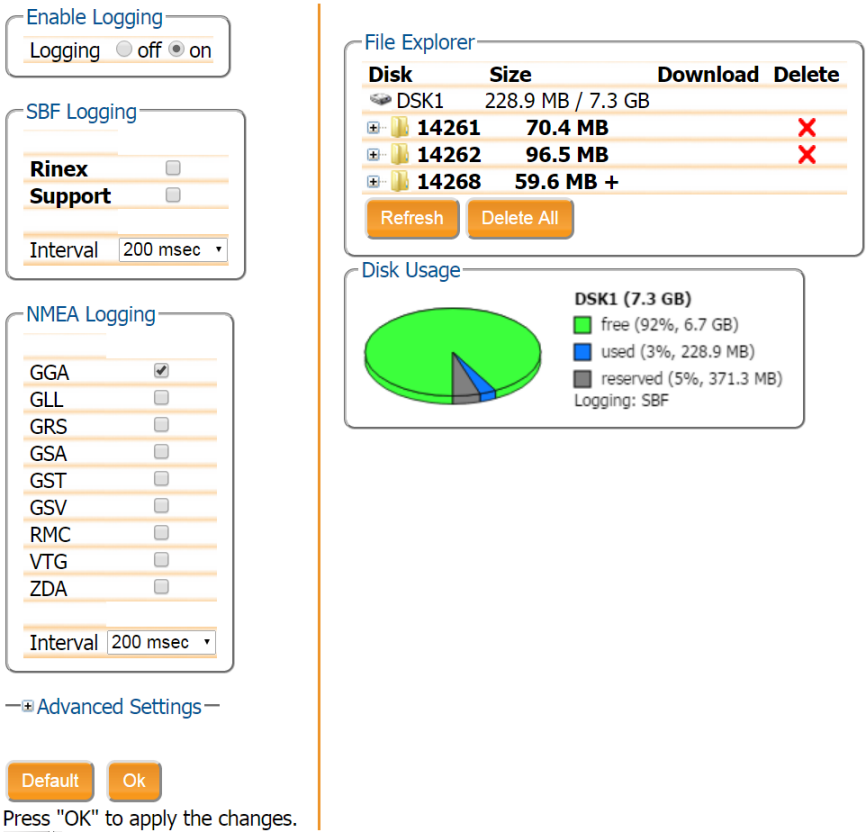


Figure 19: Logging Tab

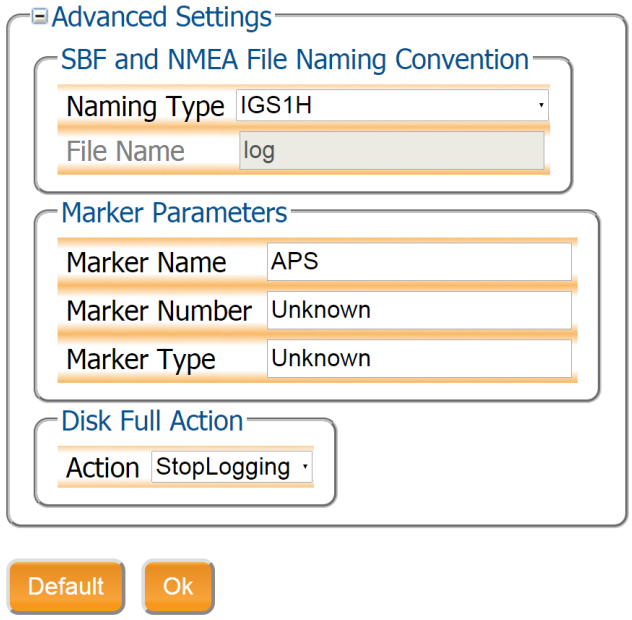
1. Click on the **Logging** tab.
2. Check the required SBF blocks and NMEA messages.
3. Select the logging interval.
4. Activate the logging by setting Logging to on.
5. Click OK to apply the settings.

6.3.2 Advanced Settings for Logging

Typically the Advanced Settings for Logging are not reconfigured by the user.
So this section may be skipped during the initial configuration.

The Advanced settings for logging are elaborated in APS-NR2 Firmware Command Line Interface Reference Guide.
The "Disk Full Action" and "SBF and NMEA File Naming Conventions" are elaborated in the section "Logging Commands"
The Marker Parameters are elaborated in the section "Session Settings Commands"

1. Click on the Logging tab
2. Click on Advanced Settings.
   Advanced settings allow for a filename and marker name to be specified.



Press "OK" to apply the changes.

Figure 20: Web Interface Logging - Advanced Settings

7 Set the Antenna Height

The antenna height is the offset between the measured point and the Antenna Reference Point. Practically this is the height of the survey rod.

The APS-NR2 automatically compensates for the Antenna Phase Center.

1. Click on the GNSS tab and enter in an antenna height.
2. Click Apply when finished.
   In this example, 2 meters was used.

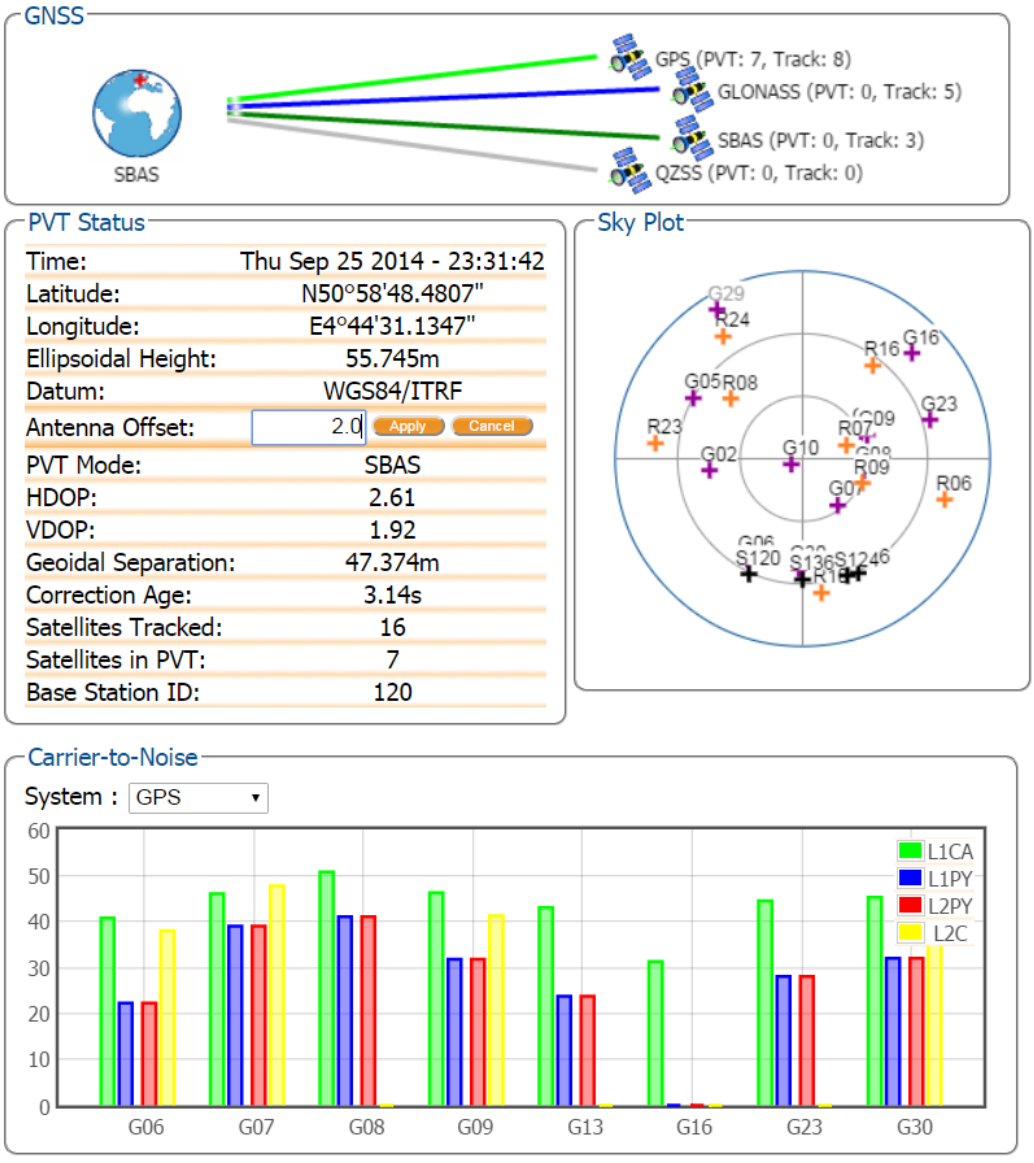


Figure 21: GNSS Tab : setting Antenna Offset

8 Finalizing the configuration

8.1 Make the settings persistent

If the user has consistently pressed Save when the pop up shown below has appeared on the screen, all settings will be persistent and will be applied again when the device powered on.

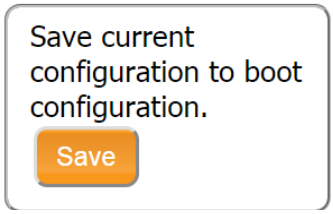


Figure 22: Save to Boot pop up

If the user is not sure all settings have been stored, the procedure below is to be executed.

1. Click on the Admin tab
2. Select Current in the Source drop down box as shown in Figure 23.

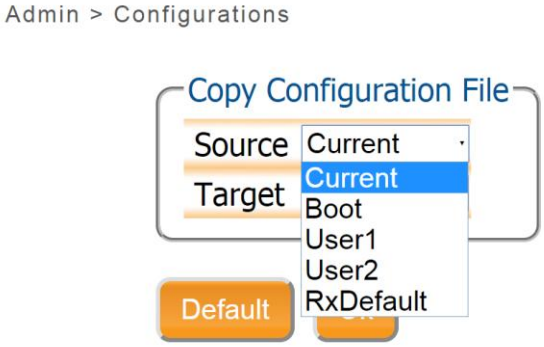


Figure 23: Select Current as Source

3. Select Boot in the Target drop down box as shown in Figure 24

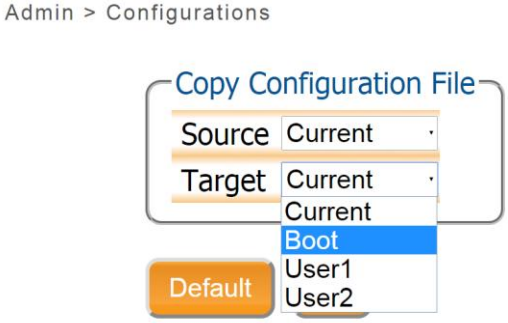


Figure 24: Select Boot as Target

4. Click the OK button shown in Figure 25

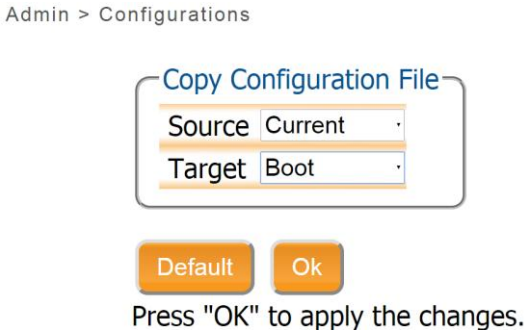


Figure 25: OK to execute the copy

8.2 Switch off Wi-Fi

The nominal battery lifetime of a full working day can only be improved if Wi-Fi is switched on only during configuration.

Therefore the user is advised to switch off Wi-Fi after the configuration is completed.

The user can switch off Wi-Fi by clicking the power button twice as described in section "3.2 Power Button Functions" on page 14 or by clicking the on/off toggle button in the Overview tab of the Web Interface as shown in Figure 26.

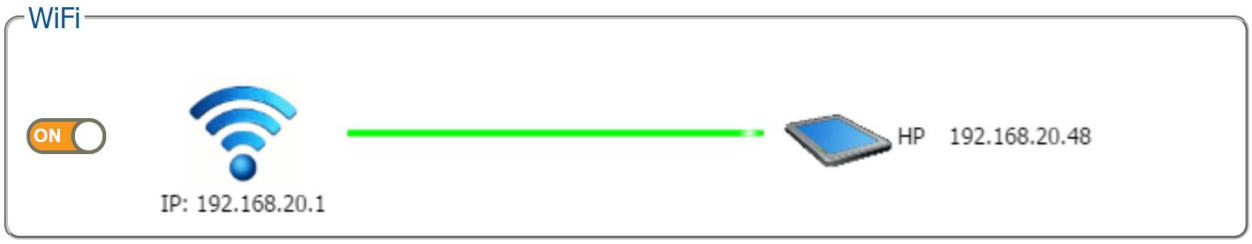


Figure 26: Wi-Fi On/Off toggle button in the Overview tab

9 Retrieving the collected data from the receiver

As described in section "6.3 Activate Logging" on page 29 the collected data can be stored on the internal disk.
The data can be retrieved over Wi-Fi using the Web Interface or via the USB data cable.

9.1 Using the Web Interface

1. Click on the Logging tab.
2. All the recorded files are shown in the File Explorer.
3. Click the ⬇ in the Download column of the file to be downloaded.
4. The file is now downloaded to the browser's download directory.

5. Obsolete files can be deleted by clicking the ✕ next to the file

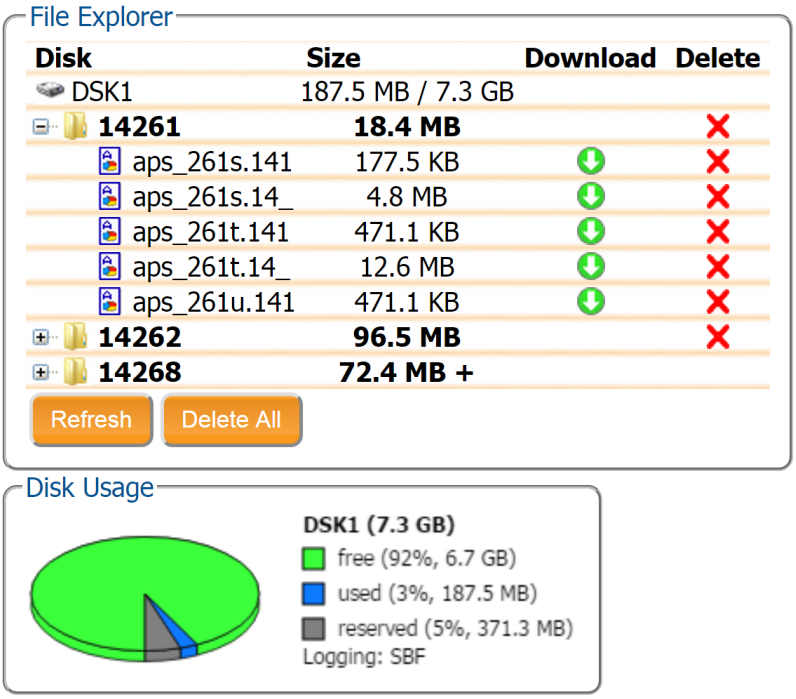


Figure 27: Logging Tab download

9.2 Using the USB connection

Connecting the USB cable will stop logging.

9.2.1 Connecting the USB data cable for the first time

To install the drivers, the user needs Administrator's rights.
An executable will have to be run to install the drivers.
The USB plug will have to unplugged and plugged in again to trigger Windows to activate the drivers.

1. Make sure the computer is connected to the internet.
   - Connect the computer using an Ethernet connection or
   - Disconnect the Wi-Fi connection between the computer and the APS-NR2.
2. Open the Windows File Explorer.
3. Connect the APS-NR2 to a USB port of your computer using the USB communication cable.
4. A new drive called "*APS-NR2"* will appear in the File Explorer.
   This may take some seconds.
   Pop ups may show indicating that drivers are being installed.
   Ignore these messages.
5. Open the new drive and go to the folder 'driver'.
6. Run the driver installer.
7. Unplug the USB cable from the computer
8. Plug the USB cable into the computer.
9. Windows will automatically start looking for the drivers.
   Windows will show a pop in the left bottom the screen indicating it is looking for the necessary drivers.
10. A pop will show indicating that drivers have been installed successfully.

9.2.2 Retrieving data via the USB connection

Connecting the USB cable will stop logging.

If the APS-NR2 has not been connected to the computer being used before then first execute the steps described in the section "9.2.1 Connecting the USB data cable for the first time" on page 35.

If the APS-NR2 has already been connected to the computer used the following steps apply:

1. Open the Windows File Explorer
2. Connect the APS-NR2 to a USB port of your computer using the USB communication cable.
3. On a Windows computer the APS-NR2 will appear as an extra drive in the file explorer after a few seconds.
4. The APS-NR2 appears as a drive named "APS-NR2".
5. The data files can be retrieved from the SSN folder.

9.2.3 Connecting via “Ethernet over USB”

The web Interface of the APS-NR2 can be accessed over an “Ethernet over USB” connection.

Connecting the USB cable will stop logging.

If the APS-NR2 has not been connected to the computer being used before then first execute the steps described in the section "9.2.1 Connecting the USB data cable for the first time" on page 35.

If the APS-NR2 has already been connected to the computer used the following steps apply:

1. Connect the APS-NR2 to a USB port of your computer using the USB communication cable.
2. Open your web browser and use the IP address: **192.168.3.1**

10 Hot Swapping the batteries and charging

10.1 Battery Swapping

Both the Web Interface and front panel LEDS give information about the battery status.

BATTERY		**NO BATTERY**	**Insert a charged battery**
	BLINKING	**LESS THAN 5% REMAINING IN USE**	**Replace the battery!**
	BLINKING	**LESS THAN 20% REMAINING IN USE**	
	BLINKING	**OK IN USE**	**No action needed, but battery can be replaced.**

Table 4: Battery not in use

BATTERY	SOLIDLY LIT	**LESS THAN 5% REMAINING IN USE**	**Do not open the battery cover!**
	SOLIDY LIT	**LESS THAN 20% REMAINING IN USE**	
	SOLIDLY LIT	**OK IN USE**	

Table 5: Battery in use

When both batteries are below 5% then the APS-NR2 will make use of both batteries.
The user may replace either battery without interrupting operation.

10.2 Battery Charging

To prevent premature aging of the batteries it is good practice to always:

- charge the batteries completely before re-inserting them into the APS-NR2.
- use the batteries until they are discharged.

10.2.1 Using the external battery charger

The APS-NR2's batteries can best be charged in the APS-NR2 external battery charger. For a totally drained battery of 3400mAh a charging time of 3.5 to 4 hours can be expected.

10.2.2 Using the A/C adapter

The APS-NR's batteries can be charged while in the device using the wall charger.
If the batteries are being charged while the APS-NR2 is switched off, there is no visual indication of the charging, all LEDs on the APS-NR2 will be off.

- When inserting the Lemo plug into the APS-NR2, the red dot has to point to the center of the device.
- Insert the plug until the edge of the plug touches the connector.

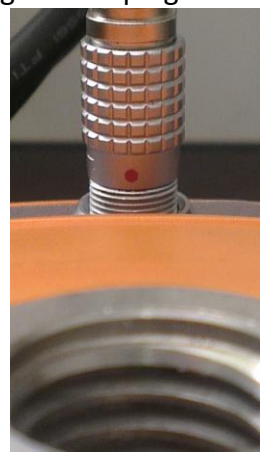


Figure 28: Lemo plug

If the Lemo plug is not properly inserted, damage may occur to the electronics of the APS-NR2.

10.2.3 Using USB adapter

The batteries can be charged using the USB cable. The charging speed is very dependent of the quality of the charger. It is recommended to use the A/C adapter for charging the batteries in the unit.

11 System Administration using the Web Interface

The Admin tab has five options:

Configuration	where user profiles can be saved and used upon startup,
Reset	where the APS-NR2 can be reset,
Upgrade	where the APS-NR2 can be upgraded,
Expert Console	where line commands can be sent and specific data can
About	where hardware and software versions can be viewed and

Further detail on each option is shown below.

11.1.1 Configuration

11.1.1.1 What is a configuration?

A collection of all settings and values that determine the behavior of the APS-NR2 are called a configuration.

The configuration that is actually being used is the Current configuration. If the user changes settings of the APS-NR2 using the Web Interface or the Expert Console these changes are stored in the Current configuration.

If the user wants to make the changes to the Current configuration persistent, the values of the Current configuration are to be copied to the Boot configuration.
Each time the APS-NR2 is started, it copies the Boot configuration into the Current configuration.

The factory defaults are stored in the RxDefault configuration. The user can enforce the APS-NR2 factory defaults by applying a reset as described in section "11.1.2 Reset" on page 42.

When the APS-NR2 is used in different set ups requiring their own specific settings, the APS-NR2 allows storing two user profiles or user configurations, User 1 and User2.
The user can store a configuration into a user profile by simply copying the Boot or the Current configuration to User1 or User2.
To restore a user profile, the User1 or User 2 configuration is copied into Boot or Current.

The table below gives an overview of the APS-NR2s configurations.

Configuration	Persistent?	Writable?	Description
RxDefault	Yes	No	Contains the factory default.
Current	No	Yes	Settings that are actually being used.
Boot	Yes	Yes	The values of Boot are copied into Current at start up.
User1, User 2	Yes	Yes	Two configurations can be stored for later use.

Table 6: APS-NR2 Configurations

The Web Interface provides the following operations on configurations:

Copy	The Copy operation allows the user to copy any of the five configurations into another configuration.
Download	The Download operation allows the user to export a selected configuration to a text file.
Upload	The Upload operation allows the user to import a selected configuration from a text file.

Table 7: APS-NR2 Operations on configurations

11.1.1.2 Managing Configurations

The APS-NR2's configurations can be managed from the Admin tab.

1. Click the Admin tab.
2. Select Configurations.
   The Configurations tab will resemble Figure 29.

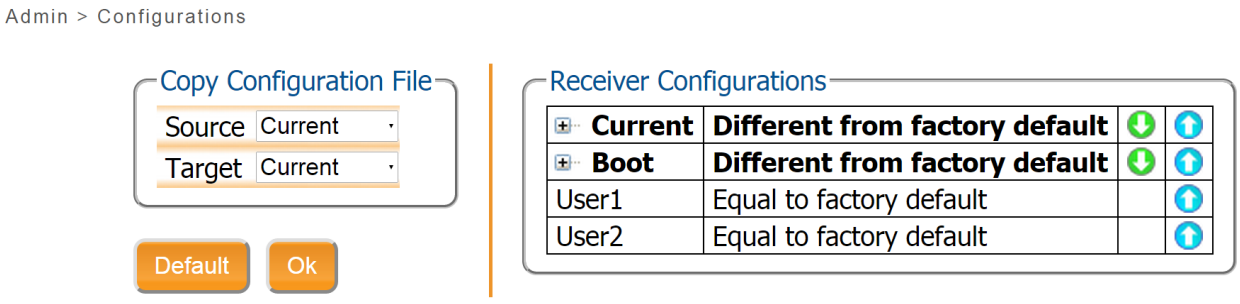


Figure 29: Web Interface Admin-Configurations

11.1.1.2.1 Copy Configuration File

1. Select the configuration to be copied in the Source drop down box.
2. Select where the Source configuration is to be copied into using the Target drop down box.
3. Click OK

11.1.1.2.2 Download Configuration

1. Click the next to the configuration to be downloaded.
2. The download is started immediately.
3. The configuration can be found in the browser's download folder.

11.1.1.2.3 Upload Configuration

1. Click the next to the configuration to be uploaded.
2. A window pops up for the user to select a file.
3. After a file has been selected the upload is started immediately.

If the uploaded file contains invalid commands, the complete file is ignored and the configuration remains unchanged.

11.1.1.3 Intermediate saving of the Configuration

After each change made to the APS-NR2's configuration while executing the steps in the following sections a pop up will appear in the bottom right of the browser window.

If the user wants to make the last changes made persistent, the user has to click Save.

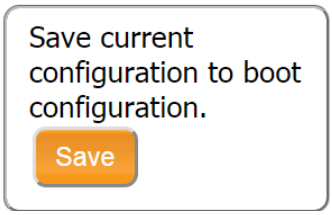


Figure 30: Save to Boot pop up

11.1.2 Reset

1. Click The Admin tab.
2. Select the Reset Option.

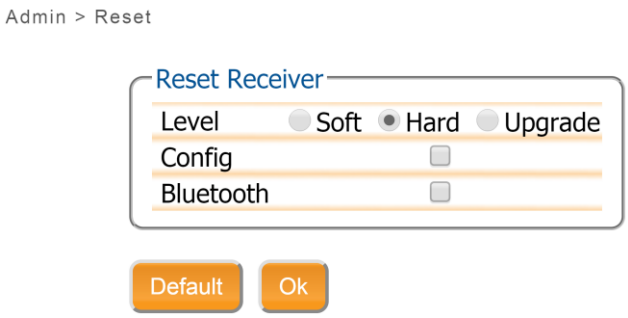


Figure 31: Admin - Reset

3. Select the desired reset level using Table 8 and Table 9.
4. Click OK
5. The APS-NR2 restarts.

Level	Description
Soft	This is a reset of the receiver's firmware. The receiver will restart operating in the same configuration as before the command was issued, unless Config has been ticked.
Hard	This is similar to a power off/on sequence. After hardware reset, the receiver will copy the Boot configuration into the Current configuration..
Upgrade	Set the receiver into upgrade mode. After a few seconds, the receiver is ready to accept an upgrade file (SUF format) from any of its connections.

Table 8: APS-NR2 Reset Levels

Erase	Description
Config	The RxDefault configuration is copied into the receiver's Boot and Current configurations. The User1 and User2 configurations remain unchanged.
Bluetooth	All information about previously paired devices is cleared.

Table 9: APS-NR2 Reset- Memory Erase Options

11.1.3 Firmware Upgrade

Admin > Upgrade

Figure 32: Web Interface Admin-Upgrade

1. Read the Release Notes carefully before performing an upgrade
   An upgrade may consist of a set of .suf files and there may be a specific sequence to be followed.

2. Click The Admin tab.
3. Select the Upgrade Option.
4. Store the .suf files required for the upgrade in a folder on your computer.

5. Click the Browse button and
   navigate to the folder where you stored the .suf files.
   Select the (first) .suf file to be loaded into the APS-NR2.
   After selecting the .suf file its name will appear next to the Browse button.

6. Click the Start upgrade button.
7. After processing the upgrade file the APS-NR2 will reset.
8. The upgrade process possibly disconnects the Wi-Fi connection.
   If so, re-establish the connection as described in section "4.7 Connect to the Web Interface" on page 20.
9. Repeat step 5 to 8 until all .suf files have been uploaded.

11.1.4 Expert Console

Line commands can be sent to the APS-NR2 via the Expert Console menu.

The drop down box showing "Mainboard (APS-NR2)" in Figure 33 allows selecting the APS-NR2's sub system the commands will be directed to.
The sub systems of the APS-NR2 are the Mainboard (APS-NR2), GNSS Receiver and the Cell modem.
Responses will be shown the window below the label Expert Console.

Specific messages may be viewed via the Message Inspector, shown near the bottom of the tab.

The command set of the APS-NR2 is described in the document named *Command Line Interface Reference Guide.pdf.*

Changing the APS-NR's configuration using the Expert Console may cause the device to malfunction.

Figure 33: Web Interface Admin-Expert Console

11.1.5 About

The APS-NR2's specific hardware and software components can be inspected in the About menu. The Receiver Identification will show this information. Also, the user may select to obtain a Diagnostic Report.

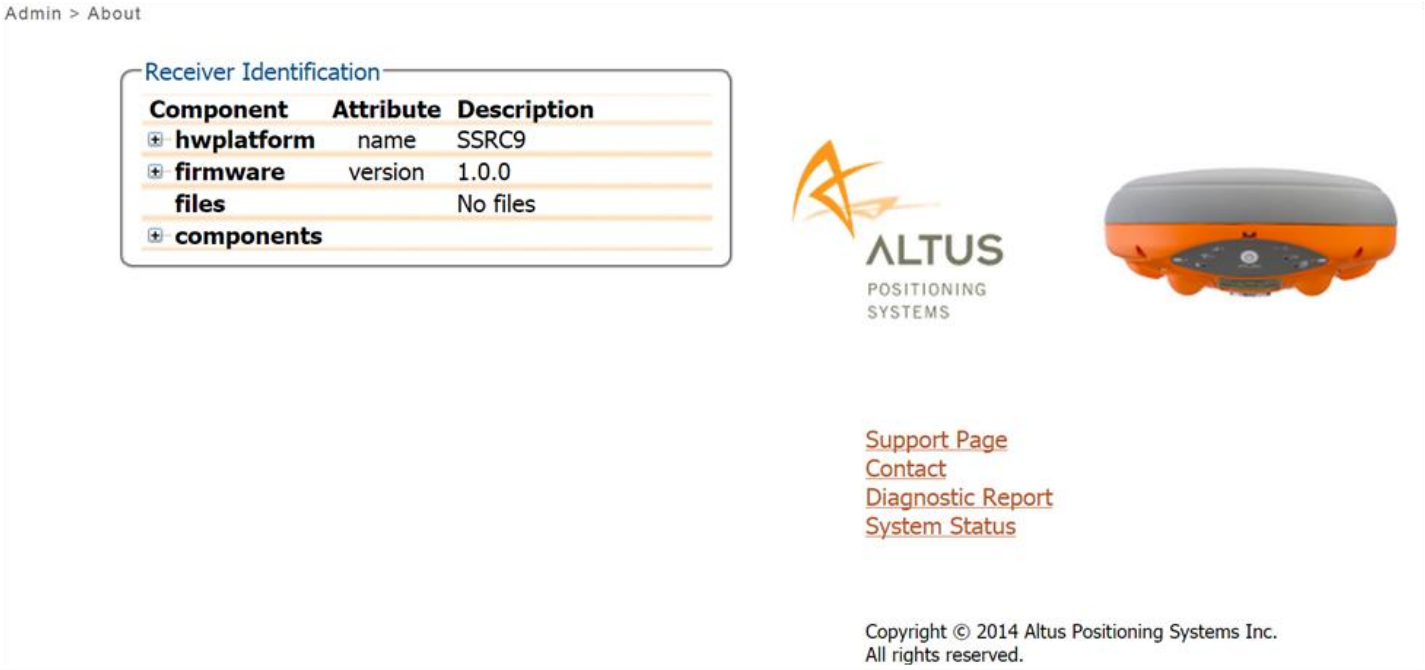


Figure 34: Web Interface Admin-About

12 Appendix

12.1 Status Icons on the Web Interface

The icons on the right hand side of the top banner quickly show the user the status of the APS-NR2.

Position mode	The APS-NR2 will function in modes of increasing accuracy, depending on the configuration.				
	Standalone	SBAS	Differential	Float	Fixed
Cellular Status	Off		On, showing signal quality		
Wi-Fi	Off		On		
Bluetooth	Off		On		
Battery	No battery		Empty	Charging	In use
Corrections	No Corrections received			Corrections being received	
Logging	Off		Logging	Disk full or not mounted	

Figure 35: Web Interface Status Icons

12.2 Front Panel LEDs

BATTERY			NO BATTERY
	BLINKING		NOT IN USE
	SOLIDLY LIT		IN USE
			LESS THAN 5% REMAINING
			LESS THAN 20% REMAINING
			OK
BLUETOOTH			OFF
		BLINKING	RADIO ON/DISCOVERABLE
			CONNECTED
WIFI			OFF
			ON
MODEM			OFF
			CONNECTING
			CONNECTED
POSITION			NO POSITION CALCULATED
			FIXED POSITION
			SBAS, DGPS, FLOAT
			STAND ALONE
CORRECTIONS			RECEIVING
			NOT RECEIVING
LOGGING			DISABLED
			LOGGING
		BLINKING SLOWLY	LOGGING DISK > 80% FULL
		BLINKING FAST	LOGGING DISK FULL OR NOT MOUNTED

12.3 The batteries

12.3.1 Batteries

Altus supplies high quality 18650 3.7V Li-Ion batteries with the APS-NR2.
These batteries are available as spare parts.

The user may choose to buy spare batteries from another source.
Before buying spare batteries from another source, it is advised to read reviews of the batteries.

- The battery specification must state that the batteries contain a protection circuit.
- The cell inside the battery must be supplied by a well known brand (Panasonic, LG, Samsung,...)

The warranty is void if the APS-NR2 is damaged by using low quality spare batteries

12.3.2 Charging

The APS-NR2's batteries can best be charged in the supplied external battery charger.
For a totally drained battery a charging time of 3,5 to 4 hours can be expected.

The user may choose to buy a charger from another source.
Before buying a charger from another source, it is advised to read reviews of the charger.

- Low quality battery chargers do not fully charge the batteries.
- Battery chargers that can charge batteries of different technologies (e.g. Li-Ion and NiMH) typically do not optimally charge the batteries.

The APS-NR2's batteries can also be charged while they are in the device using the supplied wall charger.

Although the APS-NR2 can be charged using the USB communication cable, it is not advised. Depending on the design of the USB charger used, connecting the charger may stop logging to the internal disk.

Connecting the APS-NR2 to a USB charger may stop the logging.

12.4 Cell modem Commands

The APS-NR2 uses a Telit H24 cell modem.
Specific commands for the cell modem are described *in H24 AT Commands Reference Guide 80389ST10086a Rev.4 – 2013-02-19.*
The Web Interface or the data collection software accompanying the product uses these commands to configure the modem.
It is not advised for the user to issue commands to the modem using e.g. the expert console.

Issuing commands to the cell modem using the Expert Console may cause malfunctioning of the device and will be considered improper use.

12.5 List of Typical GNSS Related Acronyms

APME	A Posteriori Multipath Estimation
ARP	Antenna Reference Point
ASCII	American Standard Code for Information Interchange
CMR	Compact Measurement Record
CPU	Central Processing Unit
CR	Carriage Return
CTS	Clear to Send
DGPS	Differential Global Positioning System
DOP	Dilution of Precision
EGNOS	European Geostationary Navigation Overlay System
ESTB	EGNOS System Test Bed
FPGA	Field Programmable Gate Array
GLONASS	Global Orbiting Navigation Satellite System (Russian alternative for GPS)
GNSS	Global Navigation Satellite System
GPRS	General Packet Radio Service
GPS	Global Positioning System
GPX	GPS exchange
GSM	Global System for Mobile communications
GUI	Graphical User Interface
HERL	Horizontal External Reliability Level
HPL	Horizontal Protection Level
IGS	International GNSS Service
LAMBDA	Least-squares AMBiguity Decorrelation Adjustment
LED	Light Emitting Diode
MDB	Minimal Detectable Bias
MOPS	Minimum Operational Performance Standards
MSAS	Multi-functional Satellite Augmentation System
MT	Message Type
NGS	National Geodetic Survey
NMEA	National Marine Electronics Association
OEM	Original Equipment Manufacturer
OTF	On the Fly
PPS	Pulse Per Second
PVT	Position Velocity Time
RAIM	Receiver Autonomous Integrity Monitoring
RINEX	Receiver Independent Exchange Format
ROM	Read Only Memory
RTCA	Radio Technical Commission for Aeronautics
RTCM	Radio Technical Commission for Maritime Services
RTK	Real Time Kinematic
SBAS	Satellite Based Augmentation System
SD	Secure Digital
SDHC	Secure Digital High Capacity
SIM	Subscriber Identity Module
UHF	Ultra high frequency
VRS	Virtual Reference Station
WAAS	Wide Area Augmentation System